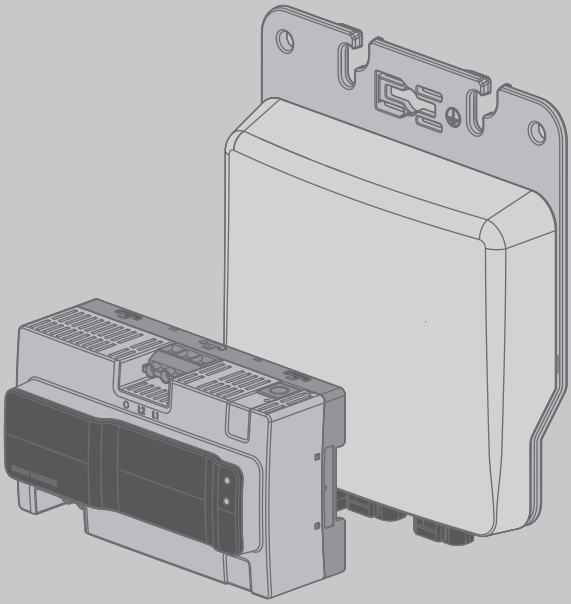
Service Manual for Installers

Troubleshooting for Power-Line Communication SUNNY BOY 240-US / SUNNY MULTIGATE-US



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Important Safety Instructions

SAVE THESE INSTRUCTIONS

This manual contains important instructions for the following products:

- SB 240-US-10 (Sunny Boy 240-US)
- Multigate-US-10 (Sunny Multigate-US)

This manual must be followed during installation and maintenance.

The product is designed and tested in accordance with international safety requirements, but as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating the product. To reduce the risk of personal injury and to ensure the safe installation and operation of the product, you must carefully read and follow all instructions, cautions and warnings in this manual.

Warnings in this Document

A warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the SMA equipment and/or other equipment connected to the SMA equipment or personal injury.

Symbol	Description
⚠ DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	NOTICE is used to address practices not related to personal injury.

Warnings on this Product

The following symbols are used as product markings with the following meanings.

Warning regarding dangerous voltage

The product works with high voltages. All work on the product must only be performed as described in the documentation of the product.

Beware of hot surface

The product can become hot during operation. Do not touch the product during operation.

Observe the operating instructions

Read the documentation of the product before working on it. Follow all safety precautions and instructions as described in the documentation.

General Warnings

⚠ WARNING

All electrical installations must be carried out in accordance with the local electrical standards and the *National Electrical Code*® ANSI/NFPA 70 or the *Canadian Electrical Code*® CSA C22.1. This document does not replace and is not intended to replace any local, state, provincial, federal or national laws, regulations or codes applicable to the installation and use of the product, including without limitation applicable electrical safety codes. All installations must conform with the laws, regulations, codes and standards applicable in the jurisdiction of installation. SMA assumes no responsibility for the compliance or non-compliance with such laws or codes in connection with the installation of the product.

The product contains no user-serviceable parts.

For all repair and maintenance, always return the unit to an authorized SMA Service Center.

Before installing or using the product, read all of the instructions, cautions, and warnings in this manual.

Before connecting the product to the electrical utility grid, contact the local utility company. This connection must be made only by qualified personnel.

Wiring of the product must be made by qualified personnel only.

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1 Information on this Document

This document describes troubleshooting in the event of the following symptoms:

- Error message **Power-line communication disturbed (10265)**
- Non-accessible modules in the Sunny Portal (shown in black) for SB-240 inverters on the page **Plant Overview** in the section **System Overview > Current**

1.1 Validity

This document is valid for the following device types:

- SB 240-US-10 (Sunny Boy 240-US)
- Multigate-US-10 (Sunny Multigate-US)

1.2 Target group

The tasks described in this document must only be performed by qualified persons. Qualified persons must have the following skills:

- Knowledge of how an inverter works and is operated
- Training in how to deal with the dangers and risks associated with installing and using electrical devices and installations
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of the applicable standards and directives
- Knowledge of and compliance with this document and all safety information

1.3 Additional Information

Links to additional information can be found at www.SMA-Solar.com:

Document title	Document type
SUNNY BOY 240-US / SUNNY MULTIGATE-US	Installation Manual

1.4 Symbols

Symbol	Explanation
⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury
⚠ WARNING	Indicates a hazardous situation which, if not avoided, can result in death or serious injury
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury
NOTICE	Indicates a situation which, if not avoided, can result in property damage
i	Information that is important for a specific topic or goal, but is not safety-relevant

Symbol	Explanation
☐	Indicates a requirement for meeting a specific goal
☑	Desired result
✖	A problem that might occur

1.5 Nomenclature

Complete designation	Designation in this document
SMA Solar Technology America LLC	SMA
SMA Solar Technology Canada Inc.	SMA
SMA Speedwire	Speedwire
PV system	PV system
Sunny Boy 240-US*	Sunny Boy, inverter, product
Sunny Multigate-US	Sunny Multigate, communication unit, product
Inverter which is located at the beginning of the PV system and is connected directly to the Sunny Multigate via the AC cable	First inverter
Inverter which is located at the end of the PV system and not directly connected to the Sunny Multigate	Last inverter

* The terms "Sunny Boy", "Sunny Boy 240-US", "micro inverter" and "inverter" are synonymous in this document. For simplicity, the general term "inverter" is often used.

2 Checklist

No.	Task	See	Checked
1.	Carry out troubleshooting for inverter and Sunny Multigate.	Installation Manual SUNNY BOY 240-US SUNNY MULTIGATE-US	☐
2.	Install current firmware package	The current firmware package is updated automatically via Sunny Portal. The update can be carried out using Sunny Explorer.	☐
3.	Check the AC cable route.	Section 3.1, page 9	☐
4.	Check the AC cable requirements.	Section 3.2, page 9	☐
5.	Check the conduits.	Section 3.3, page 9	☐
6.	Check the spacing between the AC cables.	Section 3.4, page 9	☐
7.	Check the grounding conductors.	Section 3.5, page 12	☐
8.	Check the error messages.	Section 3.6, page 14	☐

3 Troubleshooting

3.1 Check the AC cable route

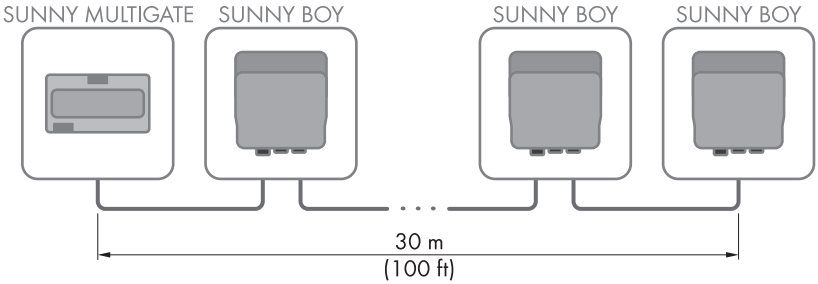

Figure 1: Maximum AC cable route of the PV system (left: first inverter with connection to the Sunny Multigate, right: last inverter)

Procedure:

- Check that the AC cable route between the Sunny Multigate and the last inverter is less than 30 m (100 ft).

  If the AC cable route is too long:

  - Change the layout of the cabling between the Sunny Multigate and the inverters. For example, install the Sunny Multigate in a different position on the wall close to the roof.
  - Shorten the AC cable route between the Sunny Multigate and the inverters. Lay the AC cable of each Sunny Multigate to the relevant inverter separately (see Section 3.4, page 9).

3.2 Check the AC cable requirements

Check the following points:

☐ No Wire Nuts® were used.

☐ No shielded AC cable was used.

☐ Only AC cable with stranded wire was used.

3.3 Check the conduits

Check the following points:

☐ Between the Sunny Multigate and inverter, a maximum of one AC cable per conduit was laid.

☐ Between the inverters, a maximum of one AC cable per conduit was laid.

☐ The conduits are made of metal or plastic.

☐ The metal conduits may be connected to the grounding conductor.

3.4 Check the spacing between the AC cables

The power-line communication is influenced by electromagnetic fields of the AC cable in a PV system with multiple multigates.

The package error rate depends on the spacing between the AC cables. The greater the distance along which the AC cables lie next to each other, the higher is the package error rate. Laying the AC cables in conduits made of metal does not reduce the package error rate.

The recommended minimum spacing between the AC cables is: 100 mm (4 in).

The AC cables can be closer together for a short period, e.g. in ducts through walls, if these cable sections are in total less than 1 m (3.3 ft).

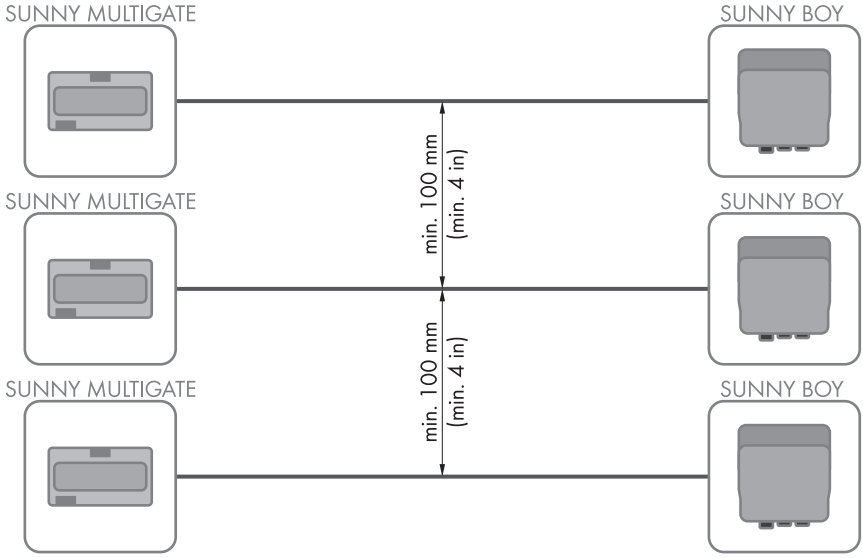

Figure 2: Spacing between the AC cables

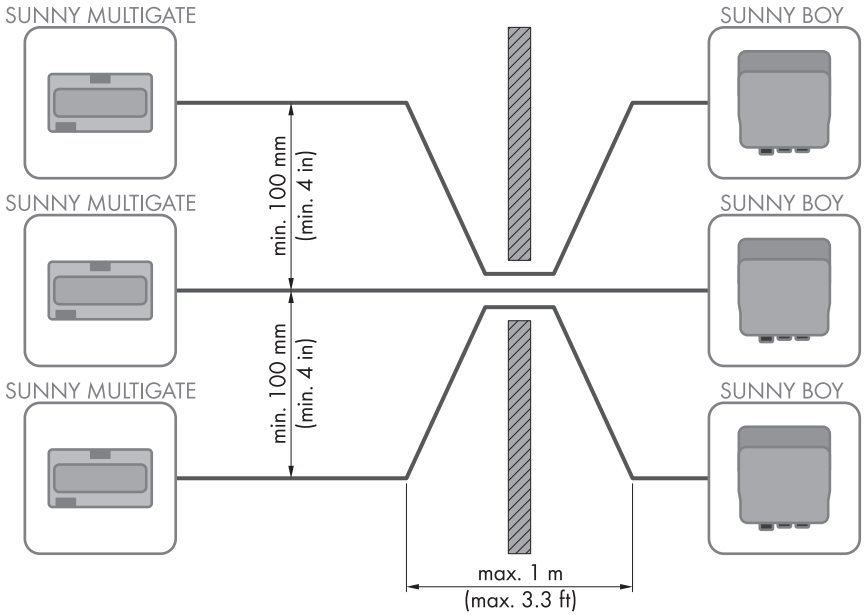

Figure 3: Spacing between the AC cables in case of a wall duct

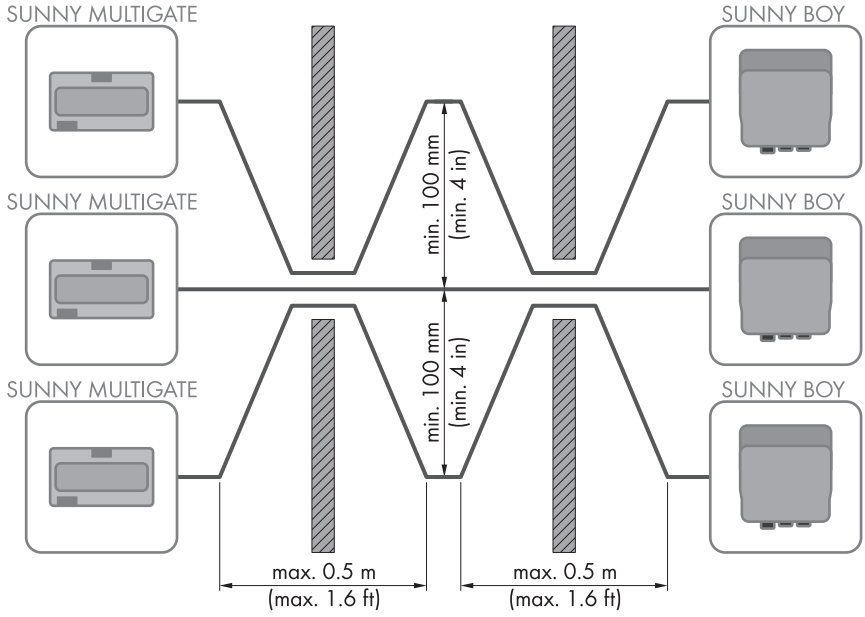

Figure 4: Spacing between the AC cables in case of multiple wall ducts

If multiple Sunny Multigates are used, it is possible to test their mutual influence.

Procedure:

1. To test the influence of the Sunny Multigates on each other, switch off all Sunny Multigates except one for at least 15 minutes.

   If the non-accessible modules in the Sunny Portal (shown in black) on the page **Plant Overview** in the area **System Overview > Current**, and the error message **Power-line communication disturbed (10265)** disappear, this means that the Sunny Multigates influence each other.
2. If the spacing between the AC cables is less than 100 mm (4 in), you should increase the spacing.

3.5 Check the grounding conductors

Check the following points:

- ☐ Each Sunny Multigate must have its own 3-wire cable with a grounding conductor.
- ☐ The grounding conductor of the utility grid must be connected to the grounding conductor terminal of the Sunny Multigate.
- ☐ The grounding conductor between the Sunny Multigate and the first inverter must not have any additional ground connection. The grounding conductor is used to return the power-line communication and is sensitive to disturbances.

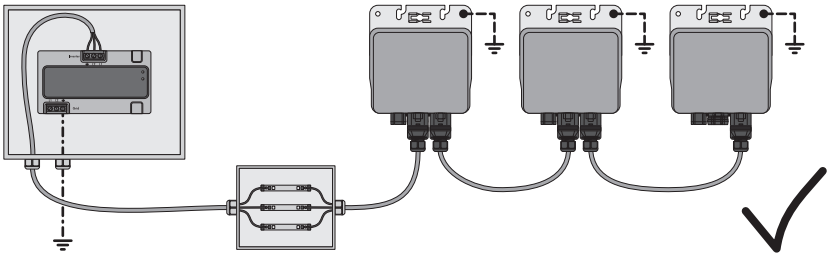

Figure 5: Permissible grounding with 1st Sunny Multigate

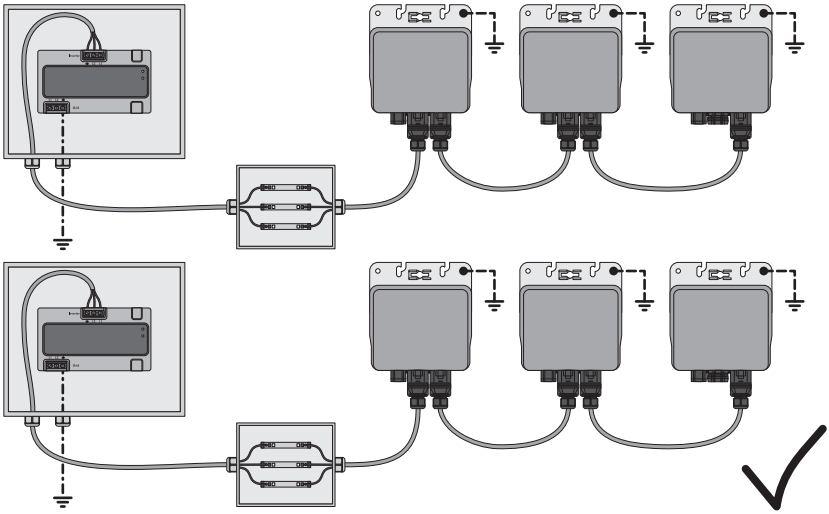

Figure 6: Permissible grounding with 2nd Sunny Multigate

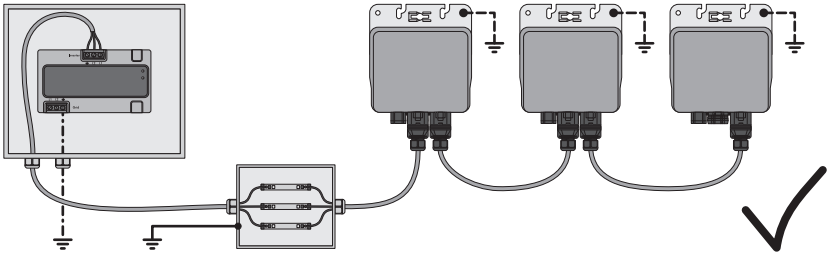

Figure 7: Permissible grounding of the conduit box

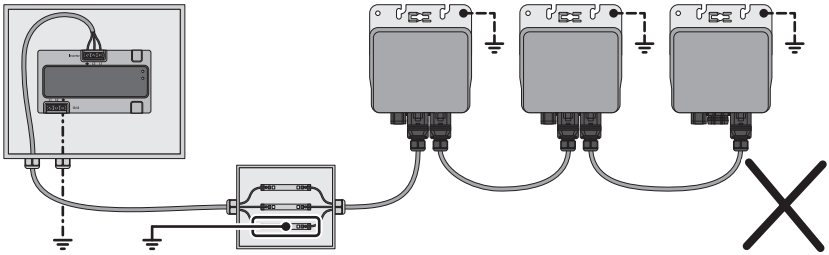

Figure 8: Impermissible ground connection between Sunny Multigate and the first inverter.

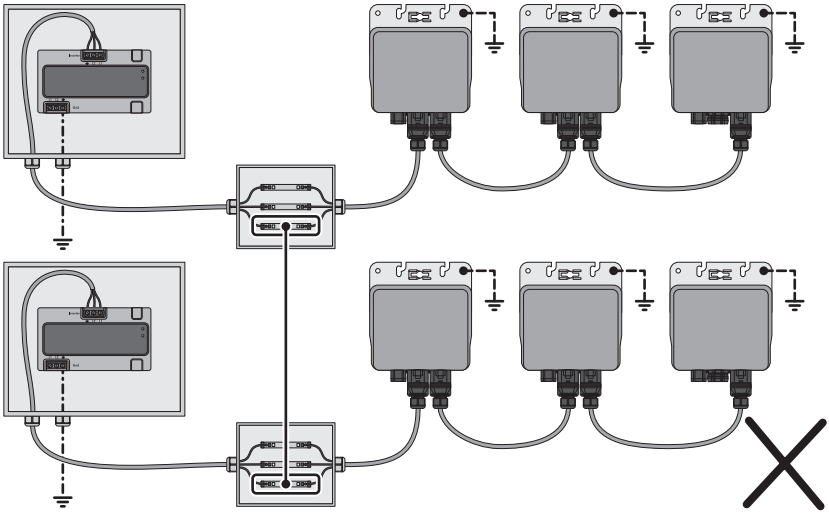

Figure 9: Impermissible connection of grounding conductor of second Sunny Multigate

3.6 Check the error messages

The warning level of the error message **Power-line communication disturbed (10265)** depends on the package error rate of the power-line communication.

Warning level	Package error rate
Info	Low package error rate
Warning	Medium package error rate
Error	High package error rate

The package error rate is the average of the incorrectly transferred data packages that have occurred within one hour. If the disturbance has been resolved, it takes approx. 15 minutes until the error messages are no longer generated.

The error messages can be seen at all user levels.

4 Contact

If you have technical problems with our products, please contact the SMA Service Line. We need the following information in order to provide you with the necessary assistance:

- Inverter device type
- Inverter serial number
- Device type of the Sunny Multigate
- Serial number of the Sunny Multigate
- Special country-specific settings of the Sunny Multigate (if applicable)
- Type and number of PV modules connected
- Message of the inverter or Sunny Multigate
- Optional equipment, e.g. communication products

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